TMF

August 1991

THE MAC FLYER - For Greater Safety in MAC Air Operations

MAC's Aero Clubs . . . page 16

TMF

THE MAC FLYER—For Greater Safety in MAC Air Operations

August 1991 MACSP 127-5 VOL XXXVIII NO. 8

page 16

page 24

FEATURES

3 Leadership And Professionalism
How to avoid human factor mishaps.

4 Safety Meeting?
One more emphasis on crew coordination.

7 Between Iraq And A Hard Place
Avoiding post-war mishaps.

13 *TMF* Instrument Quiz

16 The Aero Club
MAC's other Air Force.

20 An Approach To Risk Management
Increased awareness equals decreased risk.

24 C.R. Terror
Get me to the church on time.

DEPARTMENTS

9 Mishap With A Moral
19 Flying-Hour Milestones
28 Quickstoppers
31 After Deadlines

Gen. Hansford T. Johnson — Commander in Chief
Brig. Gen. (Sel) Donald E. Loranger, Jr. — Deputy Chief of Staff, Quality Support and Readiness

Col. Alfred C. Rivers — Director of Safety

Lt. Col. Richard L. Buck — Supervising Editor
Maj. Dale E. Van De Ven — Associate Editor
Maj. Stephen E. Behr — Associate Editor
Mrs. Frances A. Caldwell — Writer/Editor
Mr. Tommy F. O'Laughlin — Art Director

The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments, and criticisms are welcomed. Write: *The MAC Flyer*, HQ MAC/QSSE, Scott AFB, IL 62225-5101. Or call DSN: 576-3634/5542 or commercial: (618) 256-3634/5542. The editors reserve the right to make editorial changes in manuscripts which they believe will improve the material without altering the author's intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, DC 20402. Changes of address for subscription mailings should be sent to the GPO. Give both old and new address, including zip codes. USAF Active and Air Reserve Forces units should establish magazine requirements through the OPR (HQ MAC/QSSE). Other U. S. Military units should consult administrative directives.

The MAC Flyer is published at an approximate ratio of one magazine for every five MAC crewmembers, and one for every twenty MAC support personnel. Distribution: X: OPR: HQ MAC/QSSE. ISSN 0034-788X.

Leadership and Professionalism

by Lt. Col. Robert E. Sherman

I know this will probably never apply to you, but how about three minutes of your time, anyway?

You may ask, what do human factors-caused aircraft mishaps have to do with leadership and professionalism? Think about it for a minute. Hypoxia, oxygen discipline, hangover, self-medication, nutrition, crew rest, spatial disorientation, collision avoidance procedures, crew coordination, psychological stress, preflight planning, and other human factors relating to aircraft mishaps are all subjects we hear a lot about. You may think—too much about it! We hear about it at safety meetings, during annual instrument school, and read about it in articles such as this one. This repetition is necessary because aircrews are still killing themselves and/or helping the bad guys destroy our aircraft without firing a shot. Notice I said, "killing themselves," and "helping the bad guys." Aircrews do it to themselves in most cases.

A large percentage of Class A mishaps can be attributed to or influenced by the combined effect of various practices, and/or simple errors that come with being "human." "So what else is new, right?"

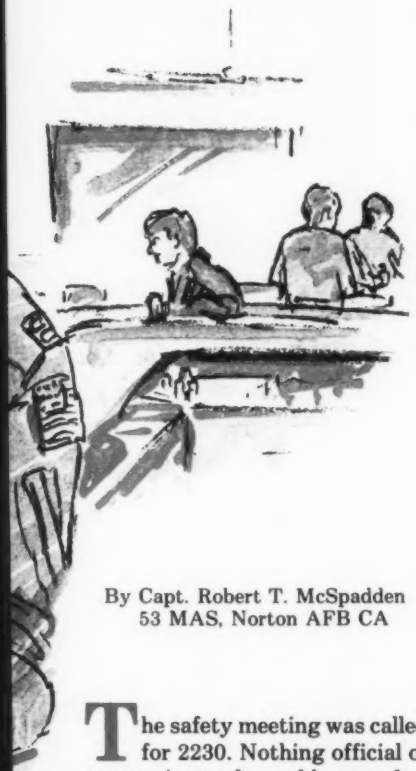
We like to consider ourselves professional airmen "Ready anytime, anywhere, to fly, fight and win, and put the load—on target—on time." Every pilot, navigator, flight engineer, loadmaster, etc., in the Air Force today has been told, briefed, or read almost everything he/she needs to know on human factors to stay out of trouble and fly airplanes safely, assuming the engines keep making noise and the wings stay where they belong.

My three minutes are about up, so quickly, what's the message? A very important way to reduce the high trend in human factor related mishaps is to take a long, hard look at our real world, day-to-day demonstration of "how we personally do business" or, put another way, our leadership and professionalism. Following rules, checklists, and crewrest; demonstrating good self-discipline, crew coordination, and preflight planning practices everytime we fly, regardless of our level of fatigue or stress, is just plain tough to do. Some of the personal requirements needed to carry this out include: maturity, constantly fighting complacency, staying in shape to minimize the inevitable onset of fatigue, and planning the unexpected. Think "what if?" and talk it over with your squadron mates. Think war. We must constantly remember why we are here and how much stress we are under in wartime. Remember the F-111 air strike in Libya? A 5,000-mile round trip with 5 aerial refuelings and a coordinated low level bombing attack at night over intensive hostile fire, is not your ordinary run-of-the-mill mission. Also remember all those people whose safety or life may depend entirely on your ability to cope during the mission. Set the example for others. Get rid of the "it won't happen to me" attitude. Have the courage to avoid being "one of the boys" if it jeopardizes flight safety. Some who succumb to human factor mishaps do so because of a lack of leadership and professionalism to set a good example. Put that extra effort or make unpopular but correct decisions in the aircraft, at home, at the bar, in the squadron, or any other places.

I feel strongly that 99.9 percent of all aircrew have the skill, knowlege, and ultimately, the capability to avoid human factor caused aircraft mishaps. However, it takes dedication, it takes hard work every day and a constant display of leadership and professionalism.

Safety Meeting?

1991 MAC FLIGHT SAFETY WRITING CONTEST SECOND PLACE



By Capt. Robert T. McSpadden
53 MAS, Norton AFB CA

The safety meeting was called for 2230. Nothing official of course, just a few cold ones after a long augmented day downrange and back. The name was a misnomer. Rarely did anything even remotely close to a safety meeting ever occur at these "after-work bar calls," designed instead to rehydrate a Lockheed dried body before hitting the sack for that much needed eight-hour coma. Still, it was a tradition, one most ACs found essential to bonding a crew that would likely eat, sleep, fly, and live together for two to three weeks.

Mad Dog Smith knew there would be stories to tell. For the last six months everyone in MAC had been flying close to 300 percent of normal. It was beginning to show, both on airplanes and people flying them. He also knew *The MAC Flyer* would be inundated with DESERT STORM related tales, for with any increased flying schedule there were always more incidents. Although constantly in the system, Smith himself didn't have many war stories to recount. In the last six months he had flown nearly 600 hours in the Starlifter, and no one was as tired of the roller coaster stage missions as the Dog. Anyone disputing that claim could gladly belly up to the Bumber Bar at RAF Upper Heyford and Mad Dog would buy'em a beer.

The crowd was light for a Friday night; the few on-station crews were either in bed or "burning in the window." In the corner near the big crud table sat a worn flight suit, whose owner was nursing a half-full Bud and commanding the attention of several flyers. Had Mad Dog looked closer, he may have recognized his squadron commander telling the story. Instead, he ordered the first round for his crew and chose a barstool near the wide-screen TV. Two minutes later, he recognized the man and joined Lt. Col. Ron Baxter's table. It would be the best decision Mad Dog Smith had ever made at a bar.

Baxter was what they call a "pilot's pilot;" a man who somehow managed to balance the demands of commanding a squadron while still flying just as much as any line pilot assigned to him. He had logged over 17 downrange sorties during the war and would always sit right seat for any young captain or lieutenant who would give him the random leg. Mad Dog caught on quickly with the five or six others that had their ears pinned to Baxter and soon found himself engrossed in the all-too-real mishap.

"That's when I first heard it," Baxter said, frowning. "Out of nowhere, with no warning, and almost sounding like the hollow whine of those TF-33s hanging on the wings.

'Hello, Baxter. This is fatiiiiigue. Remember me? Sure you do. Feels good to be tiiired, doesn't it, Baxxterrrrr? You know, that young captain over there wouldn't mind you closing those big heavy eyes for a few minutes. I know, I know. You said you weren't tired and told him to stretch out for an hour or so, but look at him. Sleeping like a baby'."

Mad Dog couldn't believe it; no one at the table was shaking their heads or smiling or laughing or something. After all, this was "bar call," and it sounded like one of Baxter's famous "leave 'em rolling on the floor" stories. Instead, they just sat there staring at the speaker, who seemed a little too serious himself.

"It wasn't like I was talking to myself," Baxter said. "This was someone else's voice. And the problem was, the voice was making sense. I mean, you guys know what happened yesterday. First we got one of those 'good-for-time-off but bad-for-crewrest' 20-hour releases! Then we burned in the window for five hours, got alerted on a broken airplane, and finally took off four hours after the original scheduled departure. I'd been up for 11 hours before we even left for downrange, and we still had 19 hours of work to do. To me that added up to a 30-hour day. I almost got some rack time on the way down, but turbulence over Sicily and my own screwed-up sleep stepped on that. There I was, FL330, just checked Paleochora and had almost another hour to the next position report. The other two pilots had flown the first leg down and were racked out . . . and it's dark as the Med out . . . and I'm beat. And then that damned voice came back.

'Go ahead, who's gonna

know?' it prodded. *'The intercom has been silent for a long time. Yeah, sure, you could dial up MAC common and see who's on freq, but that sounds like too much trouble. Just a couple of inches back, that's it. Yeah, good move Colonel, turn that guy from Athinai control down a notch. Good, good. Sleep, Baxterrrr. It'd feel sooo good to sleep. Just a short nap. Be up before everyone else. Nice, isn't it, saying goodnight to fatigue.'*

"God, was I dreaming?" Baxter asked rhetorically. "Couldn't be. The voice was there. I could almost see it. And there's the constantly sweeping radar. In my mind? Couldn't be dreaming. I was thinking about the war, how the crews had been coming back wiped out only to get a day or, in some cases, a few hours before going back on Bravo alert. We'd been doing a great job, moving everything and everyone in such a short time. That waiver to fly 150 hours in 30 days made it tough, because you had a hard time burning out and getting any time off. But it was for a reason . . . a damn good one, and I hadn't heard too many complaints. That's when I heard that blood-curdling scream.

'Colonel, PULLLLL UPPPP, Traffic, Colonel, twelve o'clock, PULLLLL UPPPP!!!'

"It was Doug, and before I could do anything, he had lunged forward from the engineer's station and yanked back on the yoke just as four blinding floodlights sliced through the nose. God, I had fallen asleep. There was no way we could have missed that airplane, but we did, and now the 300,000-pound machine was out of control. That was it, I thought, I'd killed us all.

"Well," Baxter said to his empty beer bottle, "You know the rest of the story."

"What?" Mad Dog broke the silence. "What happened?"

Colonel Baxter looked at the young captain with a look of surprise. As the others wandered off with heads shaking and disbelieving voices, the obviously shocked colonel quietly finished recounting the end of that horrible night. He went on to tell of the 22,000-foot altitude loss, the two seriously injured passengers, the visibly cracked horizontal stabilizer; of the almost miraculous recovery and the heroic efforts of everyone that were necessary to safely land the damaged airplane. There was no need to mention the aircrew violation, the mandatory groundings and his likely ended flying career.

Mad Dog had only one more question. "Sir, the others. How'd they know the rest of the story?"

The colonel didn't gaze away from the table. "My crew," he said almost too quietly to hear. "It was the first time I had the chance to tell them why it all happened." And then he looked straight into Mad Dog's eyes with a serious stare.

"You know, Mad Dog, you sometimes forget about all those things they tell you in safety meetings," Baxter said. "Hell, I can even remember one story that sounded all too similar to what happened last night. But sometimes, maybe you realize the things you do remember are the things you hear at these safety meetings. The ones where you tell your buddies how you missed some little detail on the flight plan or fuel card, only to have the winds change in your favor and save your butt. The conversations between flight engineers about small equipment problems the pilot may or may not have needed to hear about, only to find out later that had they informed the AC about it the outcome may have been totally different. The times the loadmaster quietly tells another over a beer about the Q-3 he luckily escaped when he missed a loose restraint. This is where you learn, Mr. Smith, out here in the system. Day in and day out.

"This is a crew command, Mad Dog. We have an advantage fighter jocks don't . . . those extra brains every single-seater wishes he had when it was hittin' the fan. Half the time we never even use it. All I had to do was raise my hand and say, 'I'm wiped, guys, how about trading out for a while.' But no, not me. There were seven crewmembers on that plane . . . seven crewmembers . . . but I was going to fly it all by myself.

"You've got to count on your crew to help out, Mad Dog. Learn all you can during these so-called safety meetings and then count on your people. Otherwise, you might just let them down. This is a crew airplane," the commander said as he turned away and slid from the chair. And then he just walked away, head down, still mumbling the same thing, "Crew airplane, crew airplane, crew air . . . ."

And Mad Dog Smith had his war story.

Captain McSpadden, another regular contributor to the writing contest, is currently a C-141 Instructor pilot at Norton AFB CA.

Between Iraq and a Hard Place

Avoiding Post-War Mishaps.

(Editor's Comment: This article is an adapted retransmission of a HQ AFISC/SE message. We at *TMF* thought it hit the mark in many areas, and found it appropriate to pass along).

The cease-fire is signed and we can all take great pride in the tremendous success of Operation DESERT STORM. Caution is warranted, however, since hard lessons may lie ahead. Following the Vietnam War, the Air Force experienced an alarming number of human factor-related mishaps, and that deadly potential now faces us again. DESERT STORM fragmented many units. Differing perspectives yielded a wide array of stresses, attitudes, mindsets, and perceptions. As our fliers and maintainers return home and reintegrate with those who didn't go, these factors may create a variety of tensions. Commanders, supervisors, instructors, flight leads,

wingmen, ACs, COs, FEs, LMs, MNs, and crewchiefs need to recognize the "back in Iraq," syndrome and how it acts upon those who were there and those who were not. Listed below are some hazardous attitudes which might surface in coming months:

Those who went:

-I'm bullet-proof: "What can hurt me now that nobody's shooting at me?" Plenty. We lose around 50 aircraft a year to peacetime flight mishaps.

-Combat vs. peacetime perspective: "This is the way we did in in the Gulf." That attitude doesn't wash either during or after the war. While in combat, our options are often limited and forced upon us quickly. Peacetime gives us the luxury to assess our options in a slower paced environment. But in both cases, the tactically sound way is the right way.

-Insubordination: "My boss wasn't over there! What does he know?" There is no substitute for discipline in war or peace.

-Ego vs. ego: "I'm better than this young pup/old man (pick one)!" Keep egos in check, we're all on the same team.

-Upgrade training: "He flew in DESERT STORM, so he must know what he's doing." Don't gloss over training because you think a person got it in the war. Maybe they didn't, and even if they did, it may not have been frequent or recent.

-Proficiency level: "I can handle anything they throw at me." Maybe a month ago, but you may have lost some of your sharpness. Proficiency levels change daily, and crews are probably not still flying the high number of sorties they flew during the conflict. Don't assume proficiency!

-Mission standards: "No sweat, we do this all the time." Back home, other demands on our time (additional duties, family, etc.) can distract us from safe mission accomplishment. Adjust standards to a daily comfort level.

-Attitude: "During the war, lives depended on putting bombs on target, supplies on the drop zone, fighters to the merge, and tankers in the track." Mission accomplishment is still important, but exercise sound judgment and know personal limits. In peacetime we can try it again tomorrow if things aren't right today.

-Guilt: Although not widespread, guilt may exist over actions taken or not taken during combat operations. Commanders and supervisors need to be aware of this and provide confidential avenues to address these concerns.

Those who stayed.

-Second class syndrome: "They must have thought I couldn't hack it." Those who did not participate directly in DESERT STORM may feel left out and wonder why they were not "selected."

-Lack of recognition. "They got the glory, and we got left holding the bag." Those holding down the fort, pulling extra duties, and helping out with families left behind may not have received as much recognition, nor as great a sense of satisfaction.

-Credibility: "I'm supposed to train this guy, but he's seen combat and may not believe what I'm telling him really matters." This could be a problem at training bases or upgrade school. Those with combat experience may, sooner or later, be trained by those without.

-Advancement: "There's an 'A-Team' and a 'B-Team', and I'm on the wrong one." Concerns may exist over being competitive for promotion/retention with peers that deployed.

Some solutions.

-Commanders: Awareness is the key; acknowledge the potential for problems. Break the ice and provide a forum for discussion. Recognize the efforts and sacrifices of those who didn't deploy. They all made important contributions to the war effort.

-Success reorientation: There is potential for an emotional letdown during training missions, vice the high of combat. Reinforce the fact that our success in the war was based on the execution of sound fundamentals during training.

-Lessons learned: Commanders, have we shared DESERT STORM lessons with everyone in our command? Spread the wealth and help bridge the experience gap resulting from the fragmented deployment of our units. It may help eliminate A-Team/B-Team perceptions.

-Spouses and families: Don't forget them after the war is over and your people are redeployed home. Different behavior styles may exist between families of deployed and nondeployed troops. Resentments and jealousies can grow. Commanders, be sensitive to this potential and provide outlets for sharing those feelings. Be sure they know the value of their support during DESERT STORM and of your appreciation for their efforts to maintain the family as a cohesive unit.

We trained the way we want to fight—we fought—we won. As we reassemble units back into their prewar form, take the time to acknowledge everyone's efforts and share lessons learned. Saddle your ego with a stringent set of mission objectives and priorities on every sortie. Keep training in perspective, stick with fundamentals, and do it right the first time and every time. Now that we've won the war, it would be a shame to buy the farm on a training mission. *FLY SAFE AND "CHECK SIX."*

Adapted From: *ALSAFECOM 01/1991*

The Cost of Illusion

Another "Failure to communicate."

FLIGHT HISTORY

On the afternoon and evening of 22 July and early morning of 23 July 1982, a cast of actors and a movie production crew were filming a motion picture at Valencia CA; a Viet Nam war film in which a village is attacked by heavy ordnance. The set consisted of 11 bamboo huts located along the shore of a shallow man-made river. The scenario included a Bell UH-1B helicopter, which served as both a movie prop and platform from which some of the ground action would be filmed. The movie

production required the detonation of special effects explosive devices prepositioned on the ground to simulate the attack.

The film director was in charge of the filming sequence. He determined the desired effects and discussed these and placement of explosives with the special effects coordinator. The coordinator, in turn, instructed special effects technicians on the placement of explosive devices. During filming, the technicians detonated the devices on cue from the coordinator.

Three filming sessions were scheduled on 22 and 23 July. About 2100 P.D.T, the helicopter departed the takeoff/landing area for the first session and flew about 600 feet east to the movie set. The helicopter was used as a camera platform during this session, hovering above the set while filming the ground scene. Special effects devices were detonated to simulate the ordnance as specified in the script. At the end of the scene, the helicopter returned to the takeoff/landing area.

The helicopter returned to the set about 2330 for the second filming session. During this flight, the pilot hovered the helicopter over the set while more special effects explosives were added. One device in the water detonated while the helicopter was almost directly above it. The pilot noted afterward that water shot into the air was dispersed by the helicopter's rotor system and obscured his vision for several seconds. Witnesses on the ground estimated the geysers and fireballs from the detonations rose as high as the 98-foot cliff behind the village. The two cameramen and one stuntman aboard the helicopter stated, during post-accident interviews, they were concerned about the exposure of the helicopter to the heat generated by detonations during this filming session.

At the postflight debriefing following the 2330 filming session, the helicopter pilot talked to the director about the unexpected eruption of water and further related his concern to the unit production manager (UPM) regarding the potential hazard caused by debris from the explosions. The UPM, who had been aboard the helicopter during the second filming session, assured the pilot he would advise the film director. Filming activity was sus-

pended about 2345 for a one-hour break. When the UPM returned he assured the pilot that the helicopter would remain over water and there would be nothing to be concerned about.

Preparations for the third filming session resumed. The script required an adult actor to carry two children from the village and wade across the river while special effects devices detonated. The helicopter would hover above the river and make a 180-degree left turn to provide the appropriate camera angle. The scene would be filmed from cameras both on the ground and in the helicopter. Two stuntmen aboard the helicopter would fire blank rounds from machine guns on both sides of the craft. The script called for total destruction of the village by explosives while the helicopter remained over the north shore of the river. A rehearsal of the scene would be held before the final filming.

Before the rehearsal, the helicopter pilot walked through the movie set to review the scenario. He personally checked security of the cardboard and palm roofs of the village huts. He was concerned the helicopter rotor downwash might dislodge these roofs and cause them to be swept up into the rotor system. The pilot did not receive, nor did he actively seek, any information from the coordinator or the UPM regarding the sequence, timing, or positioning of special effects explosions. He relayed to the coordinator that "as long as debris is not allowed to enter the rotor system and nothing is set off under the helicopter, it doesn't matter which structures you have rigged for a firebomb." During interviews conducted by the Safety Board following the accident, the UPM indicated he had assured the pilot the helicopter would not be over any explosive devices during the filming sequence.

About 0200 on the 23d, the pilot flew the helicopter to the movie set to participate in a rehearsal of the scene. The helicopter was initially positioned about 40 feet above the center of the river. There were no burst simulators detonated during the rehearsal. The turbulence generated by the helicopter rotor system during its left turn obscured visibility to the extent that one of the technicians obtained a welder's hood to protect his eyes. No other difficulties were noted.

About 0218, the helicopter took off again to film the scene. Onboard were the pilot, two stuntmen, the UPM, and two cameramen. The UPM sat in the left front seat to operate a spotlight; one cameraman was on the left side, and the two stuntmen with machine guns were positioned by the side doors. The other cameraman stood in the passenger compartment. According to the cameraman on the left side, the helicopter initially appeared to follow the same route as it had during rehearsal. When the helicopter passed over the dam, the cameraman climbed out on the left skid. He realized the helicopter was much lower than it had been during rehearsal and was over the village on the south shore rather than near the center of the river. The cameraman on the north shore of the river stated the helicopter arrived over the sampan area at a height of about 40 feet. As the helicopter hovered, the director shouted commands through a megaphone, which included a command for the helicopter to "get lower." The director later stated he did not recall having given that command. According to the assistant director, who had a VHF communications radio and was standing near the director, the director asked for the helicopter to descend. Later, the assistant director could not recall having transmitted the directions to descend to the UPM, and the UPM could not recall having received the directions. The pilot stated that after arriving over the set at 60-70 feet, he descended to align his main rotor with a strata line on the adjacent cliff at a height of about 35 feet. He then heard directions over VHF to descend. A review of film from the camera on the north shore showed that after the helicopter descended and stabilized in a hover, the special effects charges began to explode.

After three explosions, the helicopter began a level left turn to permit the cameraman on the left skid to film actors as they waded across the river. A fourth special effects device detonated and followed less than 0.1 second later by a fifth detonation. As the fifth device detonated, a column of gasoline and sawdust mixture raised and erupted into a fireball which engulfed the tail section of the helicopter.

The helicopter stopped the left turn and stabilized on a magnetic heading of about 009-degrees for less than 1 second. The helicopter then began a right ascending turn until it left the film frame. About 2 seconds later, the helicopter reappeared in the film frame in about a 20-degree tail down attitude and continued turning to the right and descending. The tail rotor assembly was missing. The helicopter crashed on the north side of the river in a "noseup" 45-degree left bank attitude, while still turning to the right. The helicopters' main rotor blades continued to turn and struck the adult actor and the two children.

The special effects coordinator and technicians stated after the accident that radio communication was provided only between the coordinator and technician who detonated the first device. The other technicians were instructed to begin detonating their

explosives when they heard the machine guns aboard the helicopter begin to fire. Although the special effects coordinator stated each technician was responsible for ensuring his area was clear before firing his explosives, the technican who detonated the explosives nearest the helicopter stated the safety of the helicopter was not discussed. Nor was he made aware of the helicopters' proposed flight path. The technician also stated his vision was restricted by the welder's hood.

The helicopter came to rest on its left side on a magnetic heading of 345-degrees. The helicopter's structure, flight controls, and rotating assemblies, except the tail rotor assembly, remained intact. There was no evidence of any pre-existing malfunction or failure.

ANALYSIS

The Safety Board's investigation concentrated on those aspects of the accident which directly related to loss of control of the helicopter and its subsequent crash.

The investigation revealed clear evidence that control was lost following separation of the tail rotor assembly. The time of separation was evident in the sound frequency spectrum analysis of the audio tape of the accident sequence. The sound analysis distinctly showed a decay of the tail rotor rpm about 1.7 seconds after reversal of the helicopter's rotational left turn. This speed decay can be associated only with separation of the tail rotor assembly since there was no concurrent decay in main rotor or engine rpm.

Damage to, or separation of a portion of a tail rotor blade creates severe control problems. If tail rotor damage occurs at a high enough altitude, the pilot may be able to enter an autorotative descent (engine no longer driving the rotor system). However, in this mishap, the pilot had neither time nor altitude to establish an autorotative descent. Consequently, when the tail rotor assembly separated, the helicopter was not controllable and a crash was inevitable.

Regardless of the specific damage to the tail rotor blades, which caused loss of the tail rotor assembly, the Safety Board finds damage was the direct consequence of the helicopter's close proximity to the detonation of special effects explosions. Specifically, detonation of the fourth and fifth devices caused the separation of the tail rotor assembly.

Although the Safety Board considers safety precautions taken by the motion picture industry during filming of stunts, combat scenes, or other dangerous activities beyond its investigative purview, it is concerned about events which led to exposure of the helicopter to the hazards of the explosions.

The pilot in command is ultimately responsible for safety of flight. None of the personnel involved, except the pilot, had knowledge of helicopters and their vulnerability to damage from debris and heat from special effects explosions. This should have prompted the pilot to initiate measures necessary to ensure the helicopter would be safely separated from the prepositioned special effects. These measures should have included, at a minimum, an insistence on a joint briefing between the director, pilot, and special effects technicians, as to the exact maneuver the helicopter would perform. They should have discussed timing of the maneuver and cueing of the detonations to the helicopter completing the left turn and moving across the river. Further, as an added precaution, the pilot should have insisted on direct radio communication with the technicians to keep them apprised of his progress and to warn them in the event alterations of the intended maneuver became necessary. In this case, however, the crew did not discuss specific measures. Instead, the pilot relied on assurances from the UPM and special effects coordinator that nothing would explode beneath the helicopter. Additionally and apparently in response to commands from the director, the pilot modified the maneuver and flew lower over the surface of the river and closer to the huts than originally planned. The operation evidently lacked the precise planning and coordination needed to conduct it safely, particularly with changes in the scenario.

PROBABLE CAUSE

The National Transportation Safety Board determine the probable cause of the accident was detonation of debris-laden, high temperature and special effects explosions too near a low-flying helicopter. This led to separation of the tail rotor assembly and uncontrolled descent. The proximity of the helicopter to special effects explosions was due to failure to establish direct communications and coordination between the pilot in command and the film director in charge of the filming operation.

APPLICATION TO MAC

How often have you heard the words communication and coordination when people analyze aircraft mishaps? This incident was another case where everyone worked toward the same goal but failed to consider the needs of each individual involved in the effort. The degree of success an aircrew experiences in communicating with the remainder of the world directly affects not only crew safety but, as shown in this mishap, the safety of those on the ground as well.

Adapted from: *NTSB/AAR-84-14*

TMF Instrument Quiz

For Helicopters Only

This COPTER approach shows objects within 10 nautical miles to scale. COPTER approaches usually show either 5 or 7 nautical miles instead of 10.

1. Your ADF receiver is inop (sound familiar, H-3 flyers?); you determine your missed approach point by:

a. Calculating a no-wind time for 2.8 nm at 90 knots.
b. Adjusting your 2.8 nm/90 knot inbound leg to compensate for reported winds.
c. Looking at where the MAP is at your alternate, since you can't identify the final approach fix without ADF.
d. Observing station passage on the VOR.

2. What maximum airspeed is this procedure designed for?

a. 65 knots.
b. 70 knots.
c. 90 knots.
d. 91 knots.

3. The "H-032" in the minima block indicates this approach is:

a. For Army or Air Force helicopters only.
b. A circling approach.
c. A helicopter "straight-in" approach.
d. A visibility-only approach.

4. For copter-only procedures, plan to land on the helipad marked by a reversed color (negative) scheme on the airfield sketch.

a. True.
b. False.

5. Which runway/landing area does this approach align you with?

a. Runway 2.
b. Runway 32.
c. Mid-field helipad.
d. This approach is to the airfield environment in general.
e. None of the above.

6. The ▽ symbol in the minima block means:

a. Tower is closed at night and/or less than 24-hour operations.
b. Takeoff minimums not standard and/or departure procedures are published.
c. Taxiways are not lighted unless requested.
d. Takeoffs are at pilot's discretion.

7. What type of approach lighting does runway 2 have?

a. ALSF-2 with sequenced flashing lights.
b. ALSF-2 without sequenced flashing lights.
c. SSALR with sequenced flashing lights.
d. MALSF with sequenced flashing lights.
e. MALSF with sequenced flashing lights and PAPI.

8. Departing Maxwell AFB AL you are cleared direct TGE, direct OMAHO, then cleared for the approach. From OMAHO, you:

a. Intercept the 032-degree bearing to AWS; descend and maintain 1,400 feet MSL until passing the FAF.
b. Maintain last assigned altitude; proceed direct to AWS, then make a procedure turn on the maneuvering side and descend not lower than 2,000 feet MSL until you've turned inbound and are established on final.
c. Descend so as to cross OMAHO at 1,400 feet MSL; fly final at that altitude until the FAF, then descend to MDA.

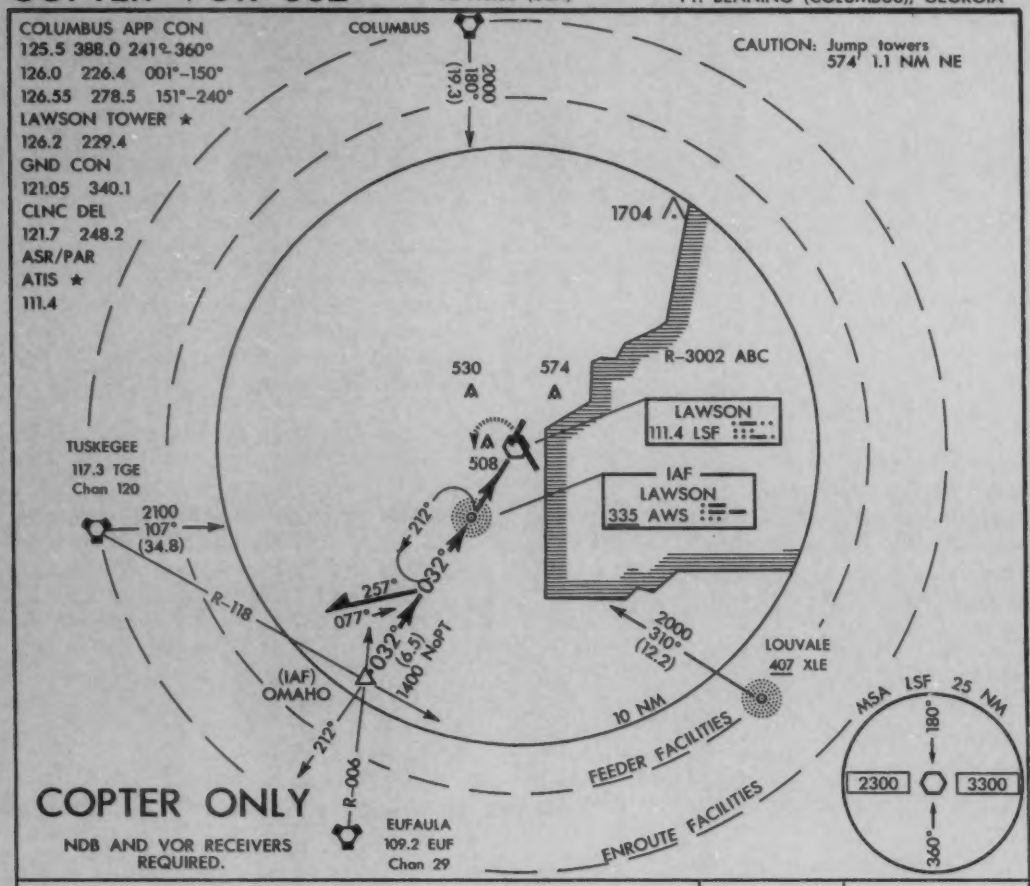
9. Your route of flight is from Columbus to AWS, the wind is calm, so drift is negligible. Columbus approach control directs you to hold at the NDB, then contact tower for further clearance. To enter holding at AWS:

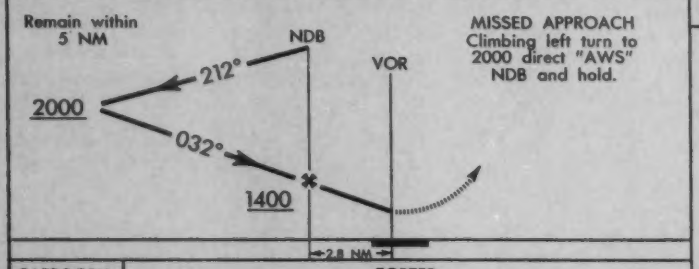
a. Turn outbound on holding side for standard pattern, turn right.
b. Turn outbound in the shorter direction to parallel or attempt to intercept the holding course.
c. Turn outbound on holding side for nonstandard pattern, turn left.
d. Upon arrival at AWS you will be conveniently aligned to fly a teardrop.

COPTER VOR 032°

AL-146.05 (USA)

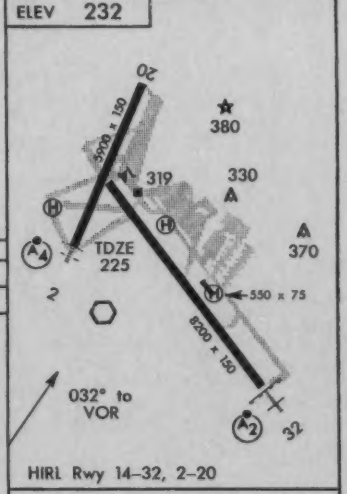
LAWSON AAF (LSF)
FT. BENNING (COLUMBUS), GEORGIA





CATEGORY	COPTER		
H-032°	760-½	535	(600-½)

▼ ▲



COPTER VOR 032°

32°20'N-85°00'W

FT. BENNING (COLUMBUS), GEORGIA
LAWSON AAF (LSF)

10. During the holding pattern you discover yourself in an unusual attitude. Application of improper recovery techniques can result in:

a. Blade stall.
b. Power settling.
c. Uncontrollable yaw if recovery is delayed.
d. All the above are possible.

11. What bank angle do most helicopters use for practicing steep turns?

a. 15 degrees.
b. 20 degrees.
c. 30 degrees.
d. 45 degrees.
e. 60 degrees.

12. The highest obstacle shown on the approach plate is:

a. 574 feet.
b. 530 feet.
c. 760 feet.
d. 1,704 feet.

13. The 574-foot obstacle consists of:

a. A single tower.
b. Jump towers.
c. Radio tower.
d. None of the above.

14. For copter-only procedures, the missed approach is based on a climb gradient of at least:

a. 125 feet per nautical mile.
b. 152 feet per nautical mile.
c. 204 feet per nautical mile.
d. 304 feet per nautical mile.

15. In a low altitude approach, a maximum 500 feet per nautical mile descent is normally planned. In copter-only approaches, the gradients may be as high as 800 feet per nautical mile. On this approach the descent gradient of the final approach segment (FAF to the touchdown zone runway 2) is:

a. 228 feet per nautical mile.
b. 419 feet per nautical mile.
c. 760 feet per nautical mile.
d. 1,400 feet per nautical mile.

THE ANSWERS

1. c. NDB and VOR receivers are both required for this approach. (Approach plate note.)
2. c. 90 knots. The criteria for copter-only approaches is based on the unique maneuvering capability of the helicopter at airspeeds not exceeding 90 knots. (AFM 51-37, para. 3-13a.)
3. c. Nomenclature for copter-only approaches in the minima block may be an H-, an S-, or S-L.A.; these approaches should all be considered "straight-in" and, therefore, a visibility-only approach may be accomplished. (AFM 51-37, para. 3-13a(1).)
4. a. True. (AFM 51-37, para. 3-13a(1).)
5. d. This approach is solely intended to put your aircraft within sight of the airfield environment. Notice that no helipads are marked with a reversed color scheme in the airfield sketch.
6. b. Takeoff minimums are not standard and/or departure procedures are published. This symbol tells civilian pilots their takeoff minimums are nonstandard and they must look in the front of the IAP book for revised minimums based on see-and-avoid criteria. Air Force pilots use takeoff minimums in accordance with AFR 60-16, which are not based on see-and-avoid criteria. To ensure obstacle clearance, the published gradient must be met or achieved when flying the published procedure. (AFM 51-37, para. 7-4c.)
7. d. MALSF (Medium Intensity Approach Lighting System) with sequenced flashing lights. (Flight Information Handbook, IAP Approach Lighting Systems.)
8. a. Intercept the 032-degree bearing to AWS; descend and maintain 1,400 feet MSL until passing the FAF. This routing is via a 'NoPT" course from OMAHO. (AFM 51-37, para. 12-2g(2).)
9. b. Turn outbound in the shorter direction to parallel or attempt to intercept the holding course. (AFM 51-37, para. 9-6b(2).)
10. d. Blade stall, power settling, and uncontrollable yaw are all possible outcomes from applying improper recovery techniques from an unusual attitude. (AFM 51-37, para. 3-17.)
11. c. 30-degrees. A turn is considered to be a steep turn if the angle of bank used is larger than that required for normal instrument flying. Most helicopters use a 30-degree bank for practicing steep turns. (AFM 51-37, para. 3-10.)
12. d. 1,704 feet. (IAP plan view.)
13. b. Jump towers as noted in a caution on the IAP plan view.
14. d. 304 feet per nautical mile. (AFM 51-37, para. 3-13a(4).)
15. b. 419 feet per nautical mile. (AFM 51-37, para. 3-13a(2) and Figure 16-2 Note.)

The Aero Club

The off-duty Air Force.

Mr. Rick McGuire (left), club manager, and Mr. Jerry Heck, chief mechanic, in the aero club hangar.

Club member Ms. Carolyn Lucy and Mr. Bob Fenton, FAA designated examiner, during her checkride (she passed).

By Maj. Dale Van De Ven
Associate Editor

"There are two kinds of people in the world. Those who want to fly and have, and those who want to fly and have not. When a person decides to jump over the fence and go from being a 'have not' to a 'have,' they come here."

This straightforward explanation voiced by Mr. Rick McGuire, Scott AFB Aero Club manager, provides a very clear-cut reason for the existence of MAC aero clubs. The latest MAC figures show a total of seven aero clubs with 81 aircraft and over 2,000 members. Mr. McGuire went on to explain how people seeking their private pilot certificate join the organization and gave me a clearer picture of how Scott Aero Club instruction is done.

"The first thing new students do is ask a lot of questions. We provide answers, and assuming they meet our eligibility requirements, they join the club.

"Industry-wide it takes around 65 hours to get your private pilot certificate. Our students average closer to 55 hours. Most of that saving results from our attitude toward flight training. We have a FAA-approved Part-141 school (four of the seven MAC aero clubs are Part-141 approved) and use a syllabus, compared to most general aviation flight training

which is done under Part 61 and does not require one. You've got to keep a written record if you're going to know exactly what stage your student is in. It's also important to provide preflight instruction before each flight so the student understands what you're going to do. They should know how to do it on the ground before they do it in the air. This is important because an airplane is the world's worst classroom; there are a lot of distractions.

"We also make a point of using headsets, which a lot of general aviation schools do without. That step alone saves us five hours. With headsets, you don't have to shout to be heard over airplane noise. The instructor and student talk and hear more. It also keeps students from getting the impression the instructor is yelling at them."

Mr. McGuire quickly made it clear that Scott Aero Club membership does not only consist of students earning their initial certificate.

"Our flight training includes everything from private to airline transport pilot (ATP), with an acrobatics program in between. We also offer private, ATP, flight engineer, and multi-engine ground school.

"The students are our most active flyers. I'd say about 40-percent of our members are pursuing ratings. We've got another 10 to 15-percent working on acrobatics, and the rest are pleasure flyers.

"We don't really have a typical member; we have people with zero hours and some with over 10,000 hours. Our youngest student pilot is a young lady who isn't old enough to get her driver's license, and our oldest member is in his late 70s. Our membership includes active duty and retired military, dependents, DOD civilian employees, a Boy Scout Explorer post, and some Civil Air Patrol.

"I can look down a listing of our members and find close to 20 people who haven't flown in the last 10 years. They're people who earned their private pilot certificate here and just enjoy supporting the place.

"As far as membership numbers go, we bounce around between 180 and 225 members. We could take up to 275 members with the airplanes we have right now. We currently operate nine airplanes, four Cessna 152s, one Cessna 172, a Piper Warrior, a Decathlon, a Mooney, and a Piper Seminole.

"The people who fly out here are 'professional' pilots. They might not have all the training an Air Force pilot does, and they all pay for their flying themselves, but they all have a 'professional' attitude and that's what counts. They think 'safety'."

Keeping the aero club safe is the primary consideration of everyone involved in the program. The club is monitored by the wing safety staff as well as its own MWR chain-of-command. Within the club itself, concern for the safety of its members is reflected in its maintenance program, governed by AFR 215-12, and in the activities of its chief pilot, Mr. Keith Mueller.

When asked to outline his duties and responsibilites as aero club chief pilot, Mr. Mueller responded, "Primarily, I coordinate student training through the club instructor cadre. We currently have 14 instructors, with a 50/50 mix of military and civilian." Earlier in the day, Mr McGuire pointed out that most of the aero club flight instructors had started their flying careers there as zero-hour students. One of the 14 instructors on staff is full-time, the others part-time.

"It's also my responsibility to initially assign students to instructors. It's very important that instructors and students have similar personalities—likes and dislikes. Matching the student and instructor is a very important part of the training process. I look at students as individuals with their own characteristics and personalities. What they all have in common is a desire to learn to fly and to learn to fly properly.

(Left to Right) Lt. Col. (Ret) Pete Russo, SSgt. Ed Mesa, and Mr. Keith Mueller prior to an acrobatics flight.

Mr. Rob Messer (left), flight instructor, and Mr. Keith Mueller, chief pilot, preflight the club's Piper Seminole.

"The safety aspect of student training is by far the most important. If I see someone not progressing as well as expected, I'll go ahead and encourage them to fly a little bit more.

"We have mandatory stage checks for those seeking a private certificate, but we also encourage 'graduation' rides for all students before they fly with the FAA examiner. Graduation rides are basically a 'precheckride checkride.' The students fly with someone other than their instructor and are put under just a little bit of pressure to perform. This way they will feel more comfortable when performing the actual checkride.

Since the Chief Pilot job is also a part-time position, I asked if Mr. Mueller had aspirations of moving on to other higher-paying positions in the aviation community.

"I became the chief pilot primarily because I've been involved in flight training for the last 16 years. I've been instructing since 1975 and I do it because I enjoy it. I've had several opportunities to fly in an airline environment and I really don't care for that lifestyle. I do this not as a part-time job, but because it's something I love to do.

"The aero club offers a tremendous opportunity. The rates we see here are by far the best in the flight instruction industry. I know of no place in this area that's competitively priced. We have a tremendous resource here. Learning to fly has become something that's not extraordinary anymore. It's for the average person and can be achieved without exceptional skills."

Since Mr. Mueller brought up the subject of cost, I checked with the club manager on how club fees were determined. According to Mr. McGuire, "Each area in the United States is going to differ on its pricing. If one club has a lot better weather and can fly more hours, the fixed cost per hour is going to be less and they can charge less. Also the number of dues-paying members plays an important part in determining fees; some clubs are so large they can make money even when they don't fly.

"We charge $30 dollars an hour for a Cessna 152 and the next closest rate in the local area is $37 dollars. Local operators charge as much as $45 dollars an hour. Compared to the most expensive location, we charge one-third less. You can't go anywhere and find a cheaper place to fly."

The motivation behind the majority of people in the club was clearly love of flying and not financial gain. I spent some time talking to the club's only full-time instructor, Mr. Rob Messer, to see if he could compare aero club instruction with what you could expect from local flight schools. Mr. Messer, a recent college graduate with a degree in aviation management, is accumulating flying hours in hopes of securing future airline employment.

"I'm paying my dues, as they say. Right now I've got just over 1,000 hours of total time with about 50 multi-engine. Most people only stay in flight instruction a year or two. Actually only 2 or 3 percent of all flight instructors registered nationwide are employed as full-time flight instructors.

"Working in the aero club has its advantages. I feel safety concerns are given a lot more consideration here than at many FBOs. I know when my student walks out the door for a solo flight, he's met not only FAA regulations but the Air Force's as well.

"The main difference between the aero club and an FBO is that we're here to serve our members, while the FBO's goal is to make money. It's a terrific advantage to get checked out here. Our drop-out rate is much less than the industry average. My students are eager to fly, eager to learn, and often times fly two or three times a week. Many times their first words to me are 'I've always wanted to do this'."

Often it seems people on base don't really understand what the aero club is and just who belongs to it. Sometimes they think of it as a bunch of little, slow airplanes constantly getting in the way. Mr. McGuire had an answer for those who don't care to share the airfield. "What they don't think about is that aero club members are people just like them. We're officers, enlisted, dependents and retired folks who want to fly. Some people just don't see the big picture."

MAC's aero clubs offer a safe place to fly at a very reasonable price. It would be a shame to lose this recreational outlet just because its presence on the airfield is not always "convenient." Not everyone connected with the Air Force can be a crewmember and be paid to fly, but the Air Force certainly should be able to support those who are willing to pay their own way. MAC aero clubs have a definite place and purpose in our aviation world.

Flying-Hour Milestones

10,000

326 MAS
MSgt. David E. Doyle

335 MAS
MSgt. Frederick R. Samer

512 MAW
MSgt. Raymond R. Craft

7,500

144 TAS
Lt.Col. Paul W. Smith, Jr.

172 MAG
SMSgt. Frank W. Brewer

914 TAG
MSgt. Charles P. Bellomo

5,000

14 MAS
MSgt. Richard A. Partridge
TSgt. Kerry D. Brown
SSgt. Timothy G. Turner

172 TAG
MSgt. Ricky R. McCraw

185 TAS
Maj. Eddie W. Sullivan

328 MAS
MSgt. Richard Snyder

914 TAG
Maj. William R. Pfeil
Maj. Lenhart D. Saner

2,500

9 MAS
Maj. Oscar F. Carroll, Jr.
Capt. David M. Appel
Capt. Terence A. Bell
Capt. Gary W. Cooke
Capt. Paul A. Garber
Capt. Tracy D. Lowell
Capt. Mark A. Miller
TSgt. Fredrick R. Ennis
TSgt. Robert J. Watras
TSgt. William A. Wray
SSgt. Kurt M. Pankofp
SSgt. Brian O. Woodard
SSgt. David M. Whitney

14 MAS
Lt. Col. James E. Hill
Maj. Harrison C. Freer
Maj. Glen A. Mackey
Capt. Dale R. Christensen
Capt. Jude A. Woodhead
Capt. John R. Ranck
TSgt. Vincent F. Ahsue
TSgt. Robert M. Kelly
TSgt. Gerardo D. Acosta
TSgt. Charles R. Lingle
TSgt. Willard M. Coleman
SSgt. Normand Guite
SSgt. John C. Woods
SSgt. Randy J. Geisen
Sgt. Michael L. Day
Sgt. Jeffrey A. Barnes
Sgt. Donald L. Ellis
Sgt. Dereck Anthony

17 MAS
Maj. Kenneth K. Alexander
Capt. Joe T. Albright
Capt. Herbert J. Finch
Capt. Kermit J. Getz
SSgt. Charles S. George

20 MAS
Capt. Kevin J. Wallace

31 MAS
Maj. Steven M. Stogsdill
Capt. John P. Hogan
Capt. Timothy J. Labarge
Capt. Richard S. Pues
SMSgt. Jonathan D. Miller
TSgt. Jon C. Guys
TSgt. Frederick W. Koch
TSgt. George F. Krauss
TSgt. Thomas F. Reeves
TSgt. Douglas C. Thoburn
SSgt. Terry W. Pannhoff
SSgt. Barry M. Thomsen

41 MAS
Capt. Mark E. Cioffi

57 MAS
Capt. Gregg R. Bechard
Capt. Ralph K. Bender
Capt. Timothy P. Kramer
Capt. John M. Ledel
Capt. Ronald E. Soldani
SSgt. Laurel L. Taft

144 TAS
Lt. Col. George J. Cannelos

167 TAG
Maj. William P. Farrell
1st. Lt. Randall B. Dell

210 ARS
Capt. Victor R. Evans
Capt. Paul R. Credit
Capt. Charles E. Foster, Jr.
TSgt. Wiley B. Mason
TSgt. John R. Silsbee

328 MAS
Maj. Michael P. Hallanan
Capt. Joseph T. Greene
Capt. Stephen D. Merriam
Capt. Joseph C. Trippy
MSgt. David A. Lenk
TSgt. Edward W. Marszalkowski
TSgt. Harold F. Truppner
SSgt. Gary M. Zawodzinski

914 TAG
TSgt. Donald C. Dowling

Ranks and units are those at time of award.

AN APPROACH TO RISK MANAGEMENT

Lowering mishap potential

By Leonard A. Sorrentino, P.E.
HQ MAC Ground Safety

Do elevated risk levels normally mean we should expect an increase in mishaps? Most organizations have some degree of control and/or options concerning acceptable levels of risk in order to perform the job. On the other hand, some operations/tasks are inherently "high risk" and must still be performed if we are to stay in business. The key to successful, as well as safe, operations is to identify the increased levels of risk and at the same time have a prevention program reducing associated mishap potential.

Perhaps the time has come to closely examine all ingredients and factors associated with increased levels or risk, i.e., we must attempt to identify/quantify cumulative risks if we intend to have a viable preventive program. Additionally, in order to develop a successful mishap prevention program, we must identify some form of measurement of mishap potential. But more importantly, this program must help us shift into high gear when we reach higher levels of risk. Shifting gear implies a positive and active (before the mishap) rather than reactive (after the mishap) approach. This means we must be capable of identifying any factor that begins to elevate risk.

Typically, a steady effort to reduce losses produces a reasonable and perhaps more effective methodology from which key leaders can focus their emphasis. Many factors enter into the equation, but among the most successful programs, the one common ingredient most evident is acceptance by senior management of the higher value of preventive rather than over-reactionary measures.

We seem to have learned this lesson (known as "sold the boss on the idea") most demonstratively in the logistics-related mishap categories. The rule books and procedures have been scrubbed hard and often, leading us to look deeper for the "root" causes and necessary fixes. Perhaps there is a similar lesson in the area generically referred to as the "human-factor caused-mishap" category.

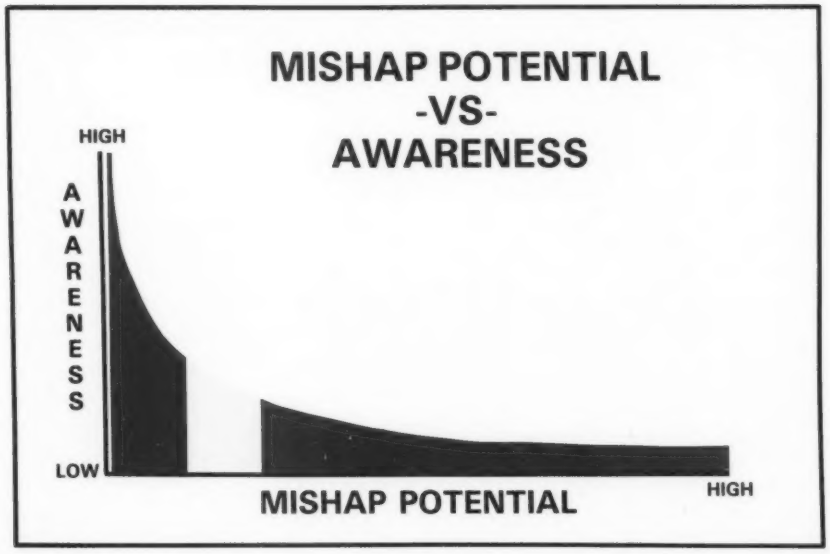


Figure 1

Regardless of the mishap under consideration, preventive measures that are employed will have the widest effect when put in place as early in the anticipated mishap sequence as feasible. Unfortunately, this is the point at which a significant percentage of operational types conclude that safety's ultimate goal is cessation of operations! The goal is more usefully defined as adherence to a safety precedence in which methodologies are listed in descending order of effectiveness as shown below:

1. Design for minimum hazard.
2. Provide safety devices.
3. Provide warning devices.
4. Control with procedures.
5. Accept the remaining residual hazards and risks.

When we continually react to human-factor caused-mishaps, it's difficult to do anything else. There always seems to be an urge to "do something," even if it's wrong. This type of reaction normally causes us to look towards the bottom of the safety procedure sequence for solutions rather than the top.

Most will agree that number 4 (control with procedures) is often the action we select in dealing with human factors, especially when the urge to do something (react) becomes almost unbearable. The first three options involve some physical change to the operating system, which takes time. Procedures can be changed more readily, and in many cases, procedural changes are certainly warranted; or perhaps the procedures were deemed adequate but simply not followed. Having made these determinations, is it time to close the book on the mishap in question? In some cases, perhaps. In most cases, no. What is an organization's typical reaction to a major loss after the initial management reactions have taken place?

We usually have a tendency to relax a bit because we "did something" to fix the problem. But, did we? Or did we simply satisfy the need to react? And once this need is satisfied, do we file the real problem away hoping it won't surface again? Ironically, chances are it won't resurface. The reason is the awareness level of the particular problem—the one causing the mishap—is sky high. As long as awareness is up, mishap potential is down. Application of this theory can be explained in the following model.

The model shows that as awareness increases upward along the curve, our mishap potential decreases. We have found that risk levels do not necessarily relate to overall mishap potential. The basic premise is that awareness/lack of awareness of elevated risks provides a better measure of mishap potential than does an evaluation of the risk level itself. Application of the model is as follows:

1. When someone operates at a high level of awareness (green area), mishap potential is low; and if distraction should occur (an unplanned event, for example) which causes a small decrease in awareness, mishap potential remains relatively low. In a mature system (one refined through sometimes painful experience), we typically find this kind of performance and level of awareness associated with the more difficult operation-one requiring planning, preparation, and usually has high visibility of top management. This, in itself, helps promote high levels of awareness concerning the risks and hazards involved. Our experience is that challenging tasks are performed extremely well and, in the vast majority of the cases, mishap free.

2. When performing a routine job with standard levels of visibility and interest, we can easily find ourselves moving into the yellow band. Look at what happens if we begin a job in the yellow area and the identical unplanned event occurs causing us to lose the same amount of awareness—it would put us into the red or danger zone of mishap potential. In fact, we may find ourselves in and out of this area numerous times depending upon our level of awareness.

3. There is one factor, however, that will move us rapidly into the danger zone (red area)—so far out, in fact, we may not realize we are there. This factor is complacency.

In most cases, we are dealing with an insidious form of complacency, most difficult to deal with. It isn't intentional. It's the type that sneaks up on our top performers. They simply don't believe it would or will ever happen to them. However, there are methods that are successful in combating it. One would be to introduce a challenge into the yellow zone, or into the routine phase of the job. It may be a simple, well-defined goal or some sort of individual or team competition. When we introduce a proper challenge, it increases the individual's awareness and allows them to perform in the green zone—at a lower mishap potential. It's surprising how small the challenge may be compared to how effective it is in reducing complacency.

An important step in developing or selecting a challenge is to involve the workers themselves. They must perform the task and are normally best suited in helping to develop an effective and lasting challenge. If you don't begin with their support, your program won't be credible. If the challenge is credible, it will endure.

Identifying jobs/tasks that become dangerously routine can be accomplished without too much difficulty. Typical indicators may include: minor incidents, attitude changes, personal appearance,

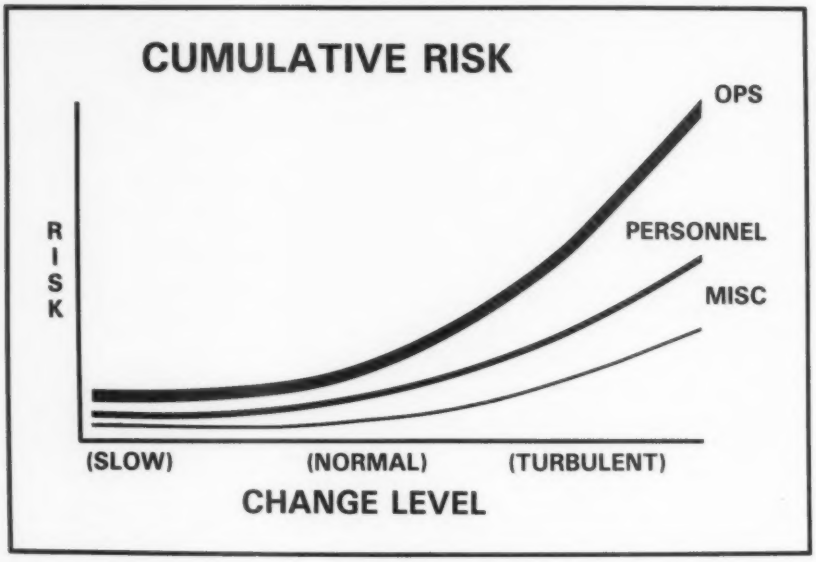


Figure 2

"good news disruptors" such as recent promotions, difficult task completion, etc. With a little experience, the caution zone can be effectively used to assist in exposing complacency and positive awareness programs established to help fight it. But how do we recognize when an operator or operation enters the dangered/red zone? This is a little more complex, but it can be done.

If we examine the activity level of an organization and associated changes in terms of cumulative risk levels, we can develop a model to assist in identifying what I will term a "vulnerability window" (VW). This window does not pinpoint or forecast a mishap occurrence; it only identifies a period of increased risk. Ignorance of that risk results in an increase in mishap potential. It is, therefore, necessary to understand what elements make up risk levels for any operation. We view risk levels in relation to change or activity levels as shown in Figure 2.

If we assume certain changes increase the level of risk of a particular task, we can identify these factors in terms of a graduated curve. For example, as we make changes in the operations activities, we associate higher risk levels with these changes. In addition, consider an increase in activity—a 30 percent increase in

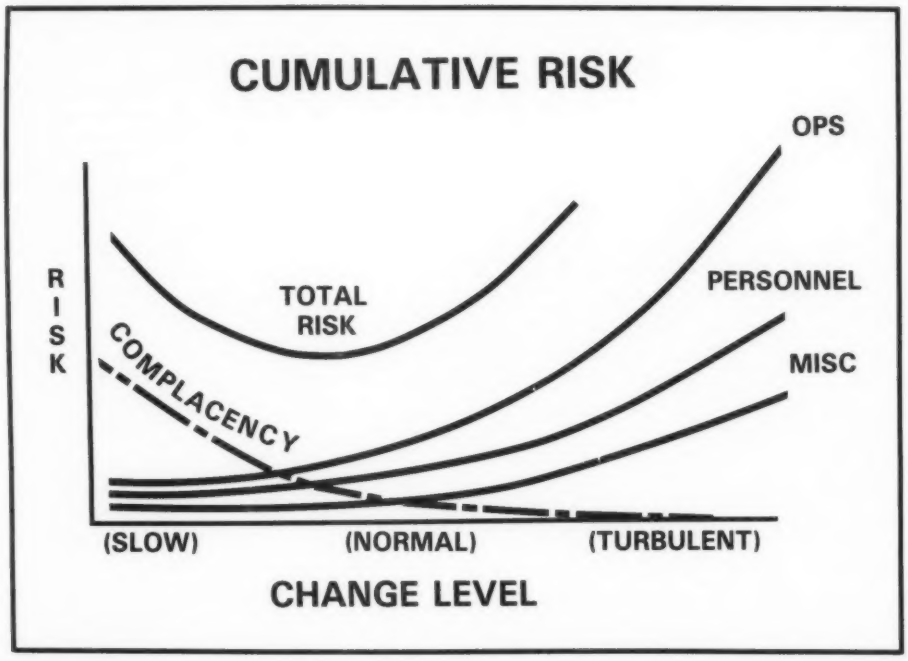


Figure 3

production, for example. Let's also say maintenance changes take place. The assumption here is that, with operational changes, risk levels rise. If these changes are accompanied by an increase in activity, the levels of risk will increase more rapidly.

Another factor (and there are many) affecting the level of risk, is people. Experience level and training are important. If the work force was increased quickly to handle increased production, the level of risk would be affected. Other measurements of change/activity affecting risk level include environmental considerations, familiarity with similar operations, etc. As these factors are identified, they are plotted to show their particular effect. Relative weights are assigned initially as a subjective management assessment and later are refined with experience.

Any factor which can be used to "take the pulse" or "temperature" of an organization should be used. Subjective deductions must be made, but they can be surprisingly accurate—not in predicting a mishap, but in identifying the vulnerability window. Not all factor curves will have the same slope since they affect risk levels in varying degrees. Again, a subjective assessment of typical factors provides an initial yard stick against which the cumulative risks can be measured. One look at the model, and the answer is clear—to keep the risks at the lowest level, simply slow down. This appears to be the answer—until you plot the one human factor curve that plagues every organization—complacency. Once we identify this, we can plot the cumulative risk curve. See Figure 3.

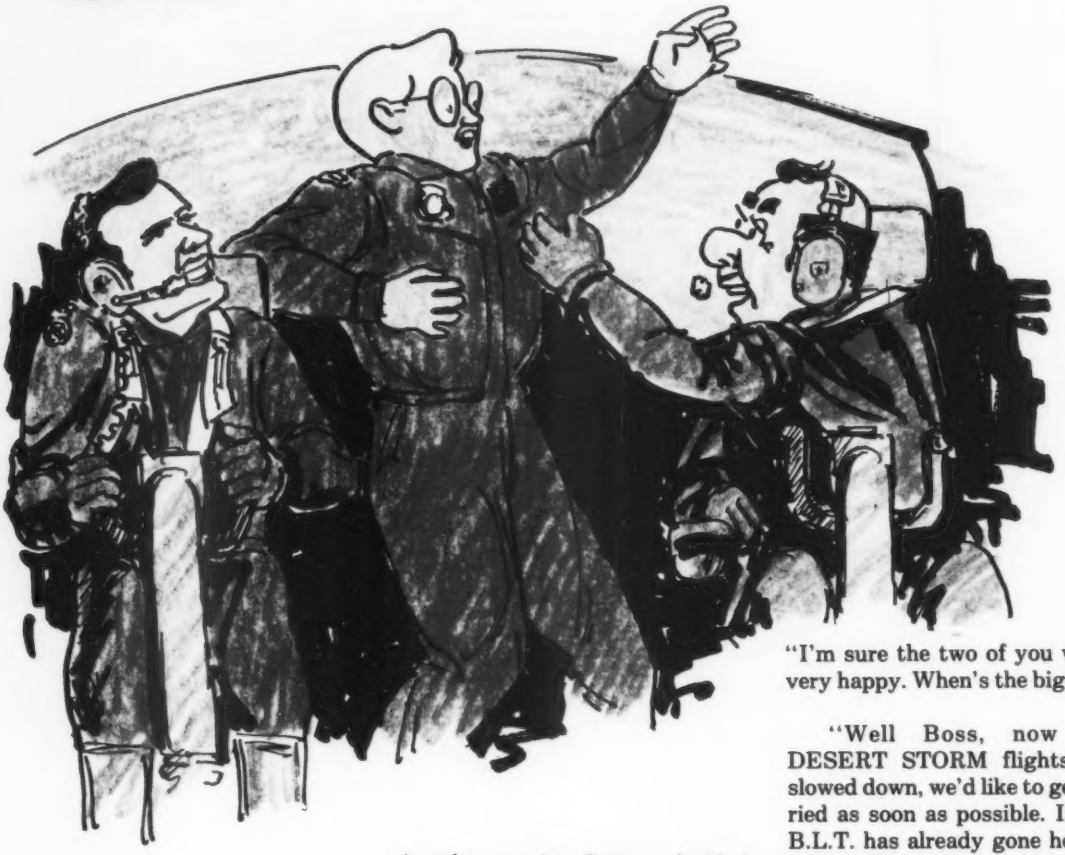
With this cumulative risk curve, we can identify both our *normal* level of operations and our accepted level of risk. This is where the *normal* amount of supervision and routine programs are judged to be effective at managing operations in a safe and efficient manner. Where along the cumulative risk curve should you become worried? Does higher risk imply a higher mishap rate? As previously discussed, risk is not the primary driver of mishap potential. The key is awareness of elevated risk levels. We can predict the occurrence of a mishap, but that is exactly what it is—a prediction. What happens after several predictions produce empty results? We are elated that a mishap was avoided, but what sort of mood develops throughout the work force and management? We appear to be caught "crying wolf" again, and this ultimately results in loss of credibility (known as decreased awareness of ongoing risks).

But suppose, instead of predicting a mishap, we attempt to use an elevated level of risk as the beginning of VW. The theory is the window remains open as long as the change and/or activity drivers cause an increased level of risk beyond established bounds—subjective boundaries, of course, but more effective than predicted losses. More effective because they can be associated with mishap potential. This puts us in the more reasonable position (as viewed from management and perhaps even the operators) of highlighting where we need to spend the majority of our time minimizing mishap potential and acknowledging the need to operate at elevated risk levels. Lack of awareness is rarely associated with a single element of risk. Rather, it is the cumulative effect of several risk factors, including complacency, that sometimes fails to get anyone's attention until a mishap occurs.

The key is that once the window is established, we track the indicators. When these indicators move us into the vulnerability window, we don't shut down—we continue to operate. We know there are times we must operate at high-risk levels. Unfortunately, we are not very attuned to the VW level of increased risk when no single element of risk stands out. During periods of accelerated operations, or "high visibility taskings," everyone appears to be aware of the increased risk involved. During these periods, mishaps have been relatively few. On the other hand, it's the subtle increase, the gradual movement up the cumulative curve, that proves to be our most vulnerable area. We have not adjusted our supervision or mishap prevention program to deal with this increased risk because we have failed to identify *all* individual factors resulting in elevated cumulative risk levels. The key is being able to identify the VW.

Once we can identify the VW, we must crank up a program to increase awareness. It can be as effective in increasing the level of awareness we are capable of subsequent to a mishap. Most of the same methods of communication will apply. If we are able to accomplish this, we can progress out of the red/danger zone in Figure 1 into the green area of heightened awareness. We need to continue this effort until the factors which caused us to move into the VW subside—causing our risk level to return to the normal/accepted bounds. In the interest of program credibility, knowing when to shift emphasis and come up with new ideas is just as important as identifying the original area of concern. It's also important to note that during periods of reduced activity, complacency can drive us into a similar VW, and safety staffs should develop subsequent awareness programs (challenge/goal establishment) to handle these periods.

C.R. TERROR



"Congratulations Blinky! Welcome to the Terror family," boomed C.R. The young navigator's announcement of upcoming marital bliss caught everyone on the flight deck by surprise. Fortunately, the C-130 only lost 300 feet as C.R. abandoned the Herk's controls and reached back to shake Blinky's hand. Considering the occasion, Sammy decided not to comment on his leader's airmanship. He very discreetly returned the aircraft to its assigned altitude and added his congratulations to those of the crew.

C.R. could not have been more pleased. It wasn't often his attempts at matchmaking worked out, but it looked like he'd hit a grand slam with Blinky and his cousin, the soon-to-be former, Betty Lou Terror (B.L.T. for short).

"I'm sure the two of you will be very happy. When's the big day?"

"Well Boss, now that DESERT STORM flights have slowed down, we'd like to get married as soon as possible. In fact, B.L.T. has already gone home to Boonsville to start making arrangements. I talked to this month's scheduler, Lt. Linus Site, and it looks like our entire crew will be able to stand down Labor Day weekend. Right now Saturday, the 31st, is the goal."

"Blinky, m'boy, I'm a bit concerned over your proposed timetable. We're not scheduled home until midday on the 29th. If we get behind our frag at all, you're go-

ing to run out of time. It's a hard day's drive to Boonsville. Maybe you should take another look at the calendar," responded the Magic Major, with a touch of concern in his voice.

"We know the schedule is tight, but the holiday weekend is the only time B.L.T.'s entire clan can all get together. I've tried to save some time by reserving a '172 from the aero club for the weekend. Even in a mighty Cessna the flying time is much less than what it takes to drive. My pilot's license is only good for Vee F'n'R weather, so I was hoping I could get my best man to fly up with me and bring the plane back after the wedding. I don't know anyone with better flying credentials," answered Blinky.

C.R.'s ears perked up just like Windsock's do when the refrigerator door opens. "Flying credentials? Just who might that be, my faithful plotter of LOPs?"

"Why Chief, we were hoping it would be you. B.L.T. and I would like it very much if you could take part in the ceremony," responded the betrothed lieutenant.

C.R. tried very hard to mask the emotions he felt, but the redness in his pudgy face and waiver in his voice gave him away. "Why Blinky, I'd be proud."

"Excuse me guys, but now that *that's* settled, do you think we could do the descent checklist?" Once again Sammy had stayed on top of the airplane and brought his wayward boss back to the job at hand.

"Right you are, Sammy. Let's get the bird on the ground and regroup at the pizza parlor with food and drink supplied by yours truly!"

Early next morning, after the standard "15+15," our band of fearless fliers set off on the first of multiple sorties between their current location and a redeployment LZ. Preflight and departure were uneventful, if you overlooked the frequent trips C.R. made to the back of the airplane as his body made it clear it was not designed to single-handedly consume one and three-quarter large, onion, pepperoni, and anchovy pizzas. The flight to the LZ was relatively short and, before it was time to open the box lunches, the crew had completed three round trips.

C.R. had completely recovered from his temporary discomfort, and having soothed his disgruntled digestive system with a "healthy heart" meal, he was ready to press-on with the day's mission. As luck would have it, the next two sorties didn't go as smoothly as the first three. Each had met with minor delays, which were resolved, but had put C.R. and crew behind schedule.

"Gadzooks lads! Once again, the clock is working against us. If we don't get back on time, this mission could carry over an extra day, and that would most certainly not be in Blinky's best interest. Sergeant Downs, let's hold our ground time on this next leg to the absolute minimum."

"I'll do the best I can, Boss. The next load is supposed to be five pallets, so I'm not sure we'll be able to save much time," replied the veteran loadmaster.

"Tut, tut m'boy, I have great faith in your abilities. Just roll'm on and get us on our way."

"Okay, Chief, I'll see what I can do. Don't worry, we'll get Lieutenant Donivan to the church on time!"

The flight back to the LZ for the sixth sortie was uneventful. C.R. was preoccupied trying to figure out the logistics involved in getting properly prepared for his role as Blinky's best man. He finally decided that all he really needed to do was call Tassels, and she would, once again, take care of the details. Just turn over the credit cards and let the games begin.

The load for this sortie was *almost* ready when the Herc taxied into parking. Sergeant Downs quickly got down to business and, with some help from the front end crew, loaded the first four pallets in near record time. Unfortunately, the fifth and final pallet, which was now built, seemed to have a mind of its own, and refused to make the transfer from the K-loader to the back of the Herc. C.R., Max, and Sammy headed for the front of the plane while Blinky and Ty worked with the loading crew to "persuade" the reluctant pallet on board.

Exercising his patented "Kick

the tires and light the fires" preflight, C.R. had all four engines running and the Herc ready to taxi just as the pallet finally broke free of the K-loader and settled onto the Herc's rail system. C.R.'s voice boomed over the intercom, "Hustle up back there. If we don't take off shortly, we'll never get the last shuttle in and will end up coming back tomorrow."

Blinky headed to the flight deck while Ty secured the load. All pallets had been of maximum dimensions so very little room was left for Blinky to work his way forward. By the time he strapped in, the Herc was at the end of the runway ready to go.

Sergeant Downs finished his preflight checks and, since the aircraft was full, decided to stay in the back of the aircraft. He sat down on the chain box, just aft of the right paratroop door, and strapped himself in.

Within seconds, the engines were producing full power, and just as Sammy released the brakes for a max effort takeoff, the last pallet shifted rearward. The pallet moved aft just far enough to pin Sergeant Down's foot between it and the end of the rollers. Even worse, when the pallet stopped moving, it somehow relocked in its new position, making it impossible for Ty to budge it. Having run out of options, Sergeant Downs quickly keyed his mike and, in a loud, rather strained voice, shouted "REJECT."

The reaction from the front of the airplane was immediate. C.R. responded with a loud "Yeeooww" while Sammy, who had been making the takeoff, retarded the throttles and did a commendable job of stopping the aircraft on the runway.

Even before the C-130 had come to a complete halt, C.R. was on the intercom, calmly inquiring as to the cause of the reject. "Gadzooks Ty, what sort of namby-pamby reason do you have for taking five years off my already limited life?"

"Boss, I'm trapped! The last pallet shifted and my foot is caught; if it shifts again, I don't think I'll be dancing at Blinky's wedding!"

"Sammy, call the ALCE folks and tell them we'll be here awhile. Also ask them to send an Army medic over. Blinky, Max, let's go back and see what we can do."

C.R. and Blinky made their way back to Ty while Max stayed up front where he could operate the rail locks. As soon as the Dymanic Duo reached the loadmaster, it became apparent Ty, although trapped, wasn't seriously hurt. C.R. and Blinky went behind the pallet and, try as they might, were unable to move it forward. Having confirmed the roller locks were engaged, the pair braced themselves behind the pallet to prevent it from rolling any further backward while Max attempted to release the locks. For no apparent reason, the locks also refused to budge. Max's repeated attempts to unlock the rollers were unsuccessful.

By now, Sammy had shut the aircraft down and an Army medic, as well as a few folks from ALCE, had gathered outside the aircraft to offer whatever assistance they could. Sammy went outside to inform the crowd about their problem, while the remainder of the crew continued to attempt to free Ty.

Max gave up on the locks and joined C.R. and Blinky. Following Ty's direction, the threesome started to remove the right side intermediate rails and, within a few minutes, Ty was released.

While the Army medic wrapped Ty's sore, but still sound, foot in an elastic bandage, C.R. tried to get a better picture of what had happened. "Ty, why would the locks not have held the pallet in its original position? Why wouldn't they release now, and what were you doing sitting on the chain box?"

"Boss, I really don't know what the problem is with the locks. Maybe the pallet's warped. We certainly had enough trouble getting it on board the aircraft. To tell you the truth, I'm not sure what would account for what happened. I stayed in the rear so I could watch the back of the load. It was impossible to see from the front. We were in a hurry and the chain box was the closest place to sit down, so I tried to save a couple minutes and stayed here," replied the relieved loadmaster.

C.R. responded in a fatherly tone, "Ty, I appreciate your efforts in trying to save us some time, but if you'd been sitting where you were supposed to, you never could have been trapped. Maybe I *was* pushing a little too hard. Still, no real damage was done and the load is certainly not going anywhere now, so let's get this show back on the road!"

"Sorry Boss," said Sammy who had just joined them. "The ALCE commander just told me they want us to stay here overnight. He called in our delay and was told to keep us here. We can expect a recut in the morning. Worst part about it is they've run out of quarters, and it looks like we'll be spending the night in the 'Herky Hilton'."

With a pained look on his face, C.R. turned to Blinky. Before the Addled Aviator could say anything, Blinky just muttered, "I know Boss, I know."

QUICKSTOPPERS

Case Of The Missing Hydraulic Fluid

The mishap C-130 was at 4,000 feet on a local proficiency mission. After the crew lowered the flaps to 50 percent (the landing gear was already down and locked), the utility suction boost pump light flickered several times, then came on steady. The pilot directed the pump turned off and sent the loadmaster to check the utility system reservoir. Utility pressure indications in the cockpit were normal; however, the reservoir was empty. The crew followed "loss of system pressure" procedures and turned off the utility system engine driven pumps. There were no leaks visible to the crew. The pilot directed the flight engineer to refill the reservoir but elected to leave the system off and return to home station. They declared an emergency and landed uneventfully. They stopped on centerline, shut down engines, and let maintenance tow the aircraft to parking. Investigation revealed that the number two hydraulic pump shaft seal had failed causing the fluid to be pumped past the seal, into the pump case, and out the saber drain. As a result, the crew was not able to find any signs of a leak, leading to the decision to leave the system off. Good thinking.

A COMBINATION OF EVENTS

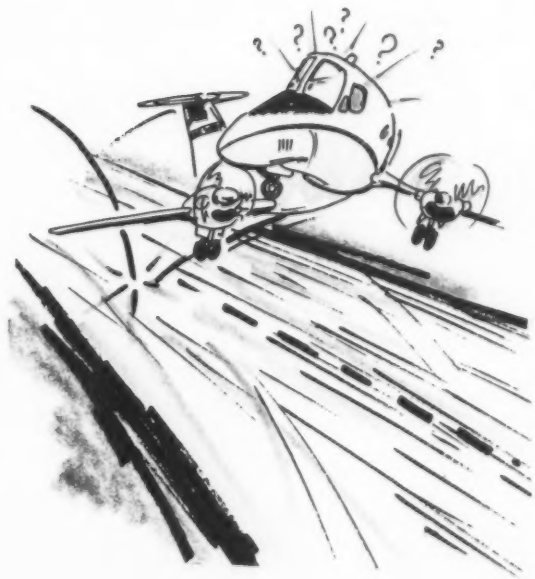
As a nurse-recruiting flight passed through 7,000 feet, the aircraft commander noticed the aircraft was not pressurizing at the normal rate. A rapid check of the air conditioning system found the cargo air conditioner stuck on full hot. The crew leveled at 13,000 feet MSL to evaluate the malfunction. The pressurization system could only maintain approximately two inches of pressure differential, and cabin altitude crept up to 11,000 feet. The crew descended to 11,000 feet where a 9,000-foot cabin altitude could be maintained. The mission was continued while troubleshooting progressed. En route, one of the aeromed technicians notified the loadmaster of a slight sinus block. The aircraft commander notified command post and made a gradual descent at less than 300 feet per minute to a normal landing. The technician, as well as a passenger with a suspected ear block, were treated and released for flight to home station, provided a cabin altitude between 5,000 and 6,000 feet could be maintained. Maintenance specialists later found the cabin thermostat, cargo compartment air flow regulator valve, and safety valve malfunctioning. Both victims stated they were suffering from slight head colds—a combination of aircraft and physiological problems could be painful at best.

Never "Assume"

The crew of this mishap Aero Club Beechcraft BE-77 "Skipper" performed the preflight inspection inside the hangar due to cold weather and snow on the ramp. After the preflight, the "safety observer" opened the hangar doors and moved the aircraft outside with a hand tow-bar while the pilot went to get headsets. The safety observer was concerned about cold air entering the hangar and rushed back to close the doors without removing the tow bar. The pilot returned and assumed the safety observer had completed the preflight. Both crewmembers boarded the aircraft without noticing the tow-bar (which was painted white) attached to the nose wheel. They started the engine and began to taxi. After rolling approximately fifteen feet, the pilot tested the brakes by applying light pressure. The nose strut compressed causing the propeller to strike the tow-bar, which sheared off and embedded in the leading edge of the left wing, puncturing the fuel cell. One blade of the propeller was slightly bent about three inches from the tip. The crew shut down and egressed without incident. Some "safety observer," huh? Again, we are reminded what "assume" means.

Today's Lesson: Trim Failure

This C-12 had just completed a touch-and-go when the student and instructor pilot noticed the elevator trim wheel moving freely. Both electrical and mechanical elevator trim were inoperative. A controllability check showed the best trim feel and control was at about 120 KIAS. The crew made a normal pattern and landed without incident. Maintenance found the right hand elevator trim tab actuator cable disconnected at the turn buckle. The required safety clip wasn't found. The safety clip installed on flight control cable turn buckles keeps the cable from twisting and unscrewing itself. Failure to install the clip led to this crew displaying their superior aviation skills.



High Heat for the Side Window

As the Hercules descended, the pilot's side swing window began to fog up. The trusty engineer cycled the NESA control switch from "Normal" to "Off," then back to "Normal." Immediately thereafter, a one-inch flame developed on the NESA wire near its junction with the window connection. The flame lasted two seconds before burning through the wire. The engineer turned off the NESA system and pulled its "protective" circuit breaker. The small amount of smoke and fumes was cleared out with ease. Another case of the wiring system sacrificing itself to protect a circuit breaker.

After Deadlines

DIRECTOR OF SAFETY SAYS GOODBYE--Col. Thomas M. James, HQ MAC, Director of Safety, ended a distinguished 27-plus-year Air Force career by retiring 31 Jul 91. Colonel James, who originally joined the HQ MAC Safety Staff as Deputy Director in 1985, assumed the Director of Safety position in 1987. Under his leadership, MAC received profound recognition through numerous safety awards. The command's outstanding safety record during Colonel James' tenure was highlighted by a "zero" Class A and B flight mishap rate for FY88 (a first for a large MAJCOM). MAC's superb safety record during Just Cause resulted in the command receiving both the Secretary of the Air Force Safety and The Major General Benjamin D. Foulois Memorial Awards in 1990. Colonel James' outstanding leadership resulted in safety becoming an integral part of exercise and contingency planning, operations and tactics, and system procurement and testing, and greatly enhanced safety awareness throughout the command. Colonel James' influence in the world of safety will be long-lasting. Goodbye and good luck, Sir.

HQ MAC SAFETY BECOMES SPECIAL STAFF AGENCY--As of 1 Jul 1991, HQ MAC Directorate of Safety became a special staff agency, designated HQ MAC/SE, reporting directly to CINCMAC. This change follows establishment of safety as a special agency at HQ Air Force. MAC Safety functional areas are: SEF--Flight; SEG--Ground; SEN--Nuclear Surety, and SEW--Explosives and Hazardous Cargo.

CONGRATULATIONS TO MAC's NEW BRIGADIER GENERALS--Donald E. Loranger, Jr., John W. Handy, Thomas D. Pilsch, Peter C. Bellisario, and Paul K. Carlton, Jr.

★ U.S. GOVERNMENT PRINTING OFFICE: 1991-554-015/40009

"I SEE YOU ARE READY FOR ANOTHER MID ROTE . . . HUH, LEFTFLAP?"

Cartoon by MSgt. Gary Benton